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Environmental Assessment

**Pecos River Restoration: Control of the Invasive Saltcedar (*Tamarix spp.*) along the Pecos River and the Salt Creek Wilderness on Bitter Lake National Wildlife Refuge
Chavez County, New Mexico**

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1.0 PURPOSE OF AND NEED FOR PROPOSED ACTION ALTERNATIVE

1.1 Introduction:

The United States Fish and Wildlife Service (Service), is proposing to implement a concentrated effort to control saltcedar (*Tamarix spp.*), which is a widespread, nonnative, invasive tree/shrub, on the North Tract of the Bitter Lake National Wildlife Refuge (Refuge). This Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposal and complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR 1500-1509) and Department of the Interior (516 DM 8) and Service (550 FW 3) policies (see Section 1.7 for a list of additional regulations that this EA complies with). NEPA requires examination of the effects of proposed actions on the natural and human environment. In the following chapters, two alternatives are described and environmental consequences of each alternative are analyzed.

1.2 Location:

The Bitter Lake NWR is approximately nine miles northeast of Roswell, New Mexico, in Chaves County. The Bitter Lake NWR consists of 24,536 acres in three noncontiguous units along the Pecos River (see Appendix A). The Middle Tract is composed of approximately 11,000 acres and contains the refuge headquarters, Joseph R. Skeen Visitor Center, auto-tour loop, Bitter Lake, several sinkholes and natural wetlands, desert uplands, riparian areas, and impoundments. The South Tract, or Farm Unit, consists of approximately 1,000 acres primarily used for agricultural croplands. The Proposed Action would occur within the North Tract of the Refuge which occupies approximately 12,160 acres and includes the 9,620-acre Salt Creek Wilderness.

1.3 Background:

The Bitter Lake NWR was established on October 8, 1937, by Executive Order 7724 “as a refuge and breeding ground for migratory birds and other wildlife.” Additional laws direct refuge activities. These include the Migratory Bird Conservation Act (16 USC 715d), which identifies the Refuge “for use as an inviolate sanctuary, or for any other management purpose for migratory birds.” The Refuge Recreation Act (16 USC 460-1) identifies the Refuge as being suitable “for incidental fish and wildlife-oriented development, the protection of natural resources, and the conservation of endangered or threatened species.” The Wilderness Act of 1964 (PL 88-577) directs the USFWS to “maintain wilderness as a naturally functioning ecosystem” on portions of the Refuge.

The Refuge supports plant and animal communities adapted to the diverse and unique habitats within the region. The isolated springs, seeps, and associated wetlands protected by the refuge have been recognized as providing some of the last known habitats in the world for several unique species. Management emphasis on the Refuge is placed on protecting and enhancing habitat for endangered species and federal candidate species, maintaining and improving wintering crane and waterfowl habitat, and monitoring, maintaining, and restoring natural ecosystem values.

Saltcedar is present through most of the Pecos River valley, and is also found throughout most of the western United States. Saltcedar has been battled for decades due to its consumption of water, its tendency to increase soil salinity and to outcompete and replace many native plants, its poor value as wildlife habitat, and because it is very susceptible to wildfires, which it is able to tolerate better than most native trees and shrubs. Saltcedar has a tremendous impact on water users and on the native habitats that it invades. It reproduces and spreads rapidly and forms nearly impenetrable, monotypic stands in many riparian and wetland areas. It threatens the fish and wildlife habitat of Bitter Lake NWR that is essential

to fully meet the purposes for which the Refuge was established.

1.4 Purpose:

The purpose of the Proposed Action is to reduce/control the widespread, nonnative, invasive tree/shrub, saltcedar, which degrades the quality and quantity of fish and wildlife habitat that is essential for the Refuge to fully meet its establishing purpose and mission.

1.5 Need for Proposed Action Alternative:

A Comprehensive Conservation Plan (CCP) was completed in 1998 which guides overall management of Bitter Lake NWR. There are two goals with corresponding objectives and strategies in the CCP that address the control of saltcedar. One goal is “To restore, enhance and protect the natural diversity on the Bitter Lake NWR including threatened and endangered species by: (1) appropriate management of habitat and wildlife resources on Refuge lands; and (2) by strengthening existing, and establishing new cooperative efforts with public and private stakeholders”.

One of the objectives includes the restoration and maintenance of native grassland and riparian habitats along the Pecos River and its tributaries to provide for native flora and fauna. In addition, an objective involves preventing decline and loss of sensitive species through the management, monitoring, and study of exotic species. The Refuge identified several strategies to help achieve these goals and objectives including working with partners to restore native vegetation through saltcedar removal and native plantings, and providing information and support to other agencies and private land owners.

A second goal that addresses saltcedar is “To restore and maintain a hydrological system that mimics the natural processes along the Pecos River drainage by: (1) restoration of the channel, as well as restoration of threatened, endangered and special concern species; and (2) control of exotic species and manage trust responsibilities for maintenance of plant and animal communities and to satisfy traditional recreational demands”. An objective under this goal calls for the control of up to 5,000 acres of exotic species and specific strategies include controlling saltcedar along the Pecos River and its tributaries, restoration of native habitats along the river, and providing information to the public about the negative effects of exotic species including salt cedar.

The Refuge CCP goes on further to say that “Management of some exotic species on the Refuge must be dealt with to protect the integrity of ecosystem values, provide natural balance within existing food webs, and to prevent unnatural conditions from altering the environment to the degradation of native plants and animals. Exotics, including carp, feral pigs, starlings, house sparrows, rock doves, saltcedar, kochia, knapweed, Russian thistle, and other species have been identified on the Refuge as having a detrimental effect on ecosystem values. These species will be removed from the Refuge whenever the opportunity presents itself.”

The U.S. Fish and Wildlife Service (Service) has a need to fulfill its responsibilities to protect Refuge resources, including migratory birds, endangered species, and fish and wildlife habitat necessary for maintaining healthy, productive, ecosystems. The Service’s Mission of the National Wildlife Refuge System (Refuge System) Invasive Species Program is: “Through partnerships, prevent, eliminate, or significantly reduce populations of aquatic and terrestrial invasive species throughout the Refuge System in order to protect, restore, and enhance native fish and wildlife species and associated healthy ecosystems”.

Saltcedar threatens the health of many of these resources on the Refuge. The Refuge, the Bureau of Land Management (BLM), the Bureau of Reclamation (BOR), the Carlsbad Irrigation District (CID), and others have gone to great lengths to control saltcedar in the Pecos River Valley. Its presence is in an essentially uncontrolled state on the North and South tracts of the Refuge, and occurs in areas of the Middle Tract that have proven difficult to access for more standard means of control, thus increasing the risk that it could expand back into areas from which it has been removed in the past. Such renewed spread could impact waterfowl and other migratory bird habitats, as well as threatened and endangered species. Also, as saltcedar populations progressively decline throughout the Pecos River Valley, any non-control of saltcedar on the Refuge promotes a secondary threat from feral hog populations that migrate from elsewhere in search of saltcedar as protective cover.

In past years when the Refuge was fully staffed, resources were insufficient to devote much attention to saltcedar on the north or south tracts of the Refuge. We now face the prospect that saltcedar will reinvade much of the area where it has been eliminated through decades of effort. If permitted to expand back into these habitats, Refuge water resources, waterfowl and other migratory birds, endangered species, and other fish and wildlife and their habitats may be seriously impacted.

Communities within the Pecos River system, irrigation districts, and the general public have a need for water and wildlife-oriented recreational opportunities that the Refuge provides. They also have a need for water from the Pecos River and the Roswell artesian aquifer for agricultural and municipal uses, and for delivery to the State of Texas under the Pecos River Compact. The Refuge provides numerous recreational opportunities for thousands of people. The New Mexico Department of Game and Fish has a need to provide for the management of healthy populations of fish and wildlife along the Pecos River, and to provide for fish and wildlife-oriented recreation. BLM has a need to manage its riparian and other lowland habitats for maintenance of healthy native ecosystems. BOR has a need to mitigate the effects of its river operations, which result in creation of conditions that can favor saltcedar. The Carlsbad Irrigation District has a need to provide water to its users. The Interstate Stream Commission needs to provide water to the state of Texas. Presence of saltcedar on the Refuge could serve as a reservoir for spread to other areas, where it could impact fish and wildlife habitat, the availability of recreational opportunities, and the quantity of water for agricultural and municipal uses.

BLM, BOR, the Interstate Stream Commission, the CID, and others have responsibilities for management of water and natural resources related to the Pecos River and/or adjacent lands. Those agencies have actively worked to control saltcedar. Failure to control saltcedar on the Refuge could affect the ability of those agencies to control it on areas under their management, and to accomplish their missions and fulfill their land and water management responsibilities.

1.6 Decision to be made:

This EA is an evaluation of the environmental impacts of the alternatives and provides information to help the Service fully consider these impacts and any proposed mitigation. Using the analysis in this EA, the Service will decide whether there would be any significant effects associated with the alternatives that would require the preparation of an environmental impact statement or whether the Proposed Action Alternative can proceed.

1.7 Regulatory Compliance:

This EA was prepared by the Service and represents compliance with applicable Federal statutes, regulations, Executive Orders, and other compliance documents, including the following:

- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)

- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Clean Air Act of 1972, as amended (42 U.S.C. 7401 *et seq.*)
- Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq.*)
- Endangered Species Act of 1973, (ESA) as amended (16 U.S.C. 1531 *et seq.*)
- Executive Order 12898, Federal Action Alternatives to Address Environmental Justice in Minority Populations and Low Income Populations, 1994.
- Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661 *et seq.*)
- Floodplain Management (Executive Order 11988)
- National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq.*)
- Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 *et seq.*)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq.*)
- Protection and Enhancement of the Cultural Environment (Executive Order 11593)
- Protection of Wetlands (Executive Order 11990)
- National Pollutant Discharge Elimination System, as amended (33 U.S.C. 1251 *et seq.*)
- The Final Comprehensive Conservation Plan and Environmental Assessment for Bitter Lake National Wildlife Refuge (1998, as required by 43 CFR 1610.5).

Further, this EA reflects compliance with applicable State of New Mexico and local regulations, statutes, policies, and standards for conserving the environment and environmental resources such as water and air quality, endangered plants and animals, and cultural resources.

1.8 Public Involvement:

On May 15, 2009, the Service announced its intent to prepare an Environmental Assessment of alternatives for the management/control of saltcedar (*Tamarix spp.*) on the North Tract of the Refuge. A 30-day scoping period from May 15 to June 15, 2009 was established under that notice. The Service provided a news release and posted a copy of the notice at the Refuge's Joseph R. Skeen Visitor Center and Roswell City Library. In addition, Refuge staff coordinated with a member of the New Mexico Wilderness Alliance regarding the project.

During the scoping period the Service received one response letter with comments that was considered as part of this analysis. The one letter was in favor of saltcedar control.

1.9 Issues Raised During Project Planning and Public Scoping:

There were no issues raised during the project planning and public scoping for this project.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION ALTERNATIVE

2.1 Alternative A--No Action Alternative:

Under the No Action Alternative, current management direction would continue. There would be no concentrated effort (direct action) to control saltcedar on the North Tract of Bitter Lake NWR. Saltcedar would continue to grow and expand its range. Currently, it is estimated that approximately 1,200 acres along the Pecos River in the North Tract (outside the wilderness area) and 300 acres within the Salt Creek Wilderness are infested with saltcedar.

2.2 Alternative B—Saltcedar Removal (Proposed Action Alternative):

The objective of the proposed action is to treat as much saltcedar (up to 1,200 acres outside the wilderness and 300 acres within the wilderness) as possible on both sides of the Pecos River in the North Tract of the Refuge. Aerial photography and satellite imagery are currently being used to more accurately map saltcedar infestations on the Refuge.

This alternative would implement mechanical, hand cutting and chemical treatment of saltcedar primarily along the Pecos River on the North Tract as this area represents the largest wholly remaining population of saltcedar on the Refuge. In addition, hand cutting and chemical treatment will be utilized on the Salt Creek Wilderness portion of the North Tract as allowed by funding and personnel availability.

Mechanical treatment on the River section of the north tract would involve the use of tracked equipment (e.g. excavators) to extract saltcedar including the root crown to minimize resprouting. Saltcedar in those areas that are not accessible with tracked equipment will be cut with chain saws and spot treated with herbicide. Foliar treatments may also be applied to smaller saltcedar shrubs.

Normally, motorized and mechanized equipment are not allowed in the Salt Creek Wilderness, however this alternative would employ the use of chain saws as the minimal tool because hand powered crosscut, bow-saws, loppers, etc. are infeasible due to the age/maturity of the trees and the extent of the infestation (i.e. numerous acres are involved). The cutting of saltcedars would immediately be followed by spot treatment of stumps with herbicide. Foliar treatments may also be applied to smaller saltcedar shrubs.

Any resprouting and new sprouting of tamarisk on the River corridor will be retreated by any appropriate means as described above. All Terrain Vehicles (ATVs) affixed with hand-held tank sprayers may be used in areas along the river corridor outside the wilderness area. Resprouting in the wilderness area will be treated by spot application of herbicide using hand crews and backpack sprayers.

Any mechanical treatment will occur August through April to avoid negative impacts to nesting birds. Chemical treatments may occur throughout the year on a smaller scale basis (smaller saltcedars). Field scouting for nesting birds will occur to avoid negative impacts to nesting migratory birds.

Below is a detailed description of chemicals to be used, timing of application, and buffers set in place to reduce adverse affects concerning application of these chemicals. All chemical labels/MSDS sheets can be obtained at www.cdms.net/manuf/manuf.asp.

Garlon 4 herbicide (EPA Reg No 62719-40) with JLB oil will be applied as a basal bark application (spot treatment) to saltcedar using hand held or backpack sprayers when winds are less than 10 mph (blowing away from open water). Treatments will not occur within 30 feet of open water. Treatments will not occur within two days of forecasted precipitation.

Habitat herbicide (EPA Reg No 241-426) as a diluted solution (8-12 oz of habitat per 1 gallon of water for cut stump and .6 - 6.5 oz of Habitat per gallon for foliar application) will be applied to saltcedar utilizing a cut-stump or foliar application method. Target plants will be cut to near ground level with chainsaws, followed by the spraying of cut surfaces with hand held or backpack sprayers or applied directly to each side of the target plant, penetrating approximately 70% of the plants foliage. Use of Habitat herbicide was recommended by Regional Invasive Species Coordinator since it can be used near water and treatments will occur up to the water's edge in some cases. As with Renovate 3, Garlon 3A,

and Rodeo herbicides, application will occur throughout the year. It is noted within the product MSDS that there is a high probability that this product is not acutely harmful to fish and aquatic invertebrates (Rainbow trout/LC50 (96h) : >100 mg/l and *Daphnia magna*/EC50 (48h): > 100 mg/l). In addition, it is noted within the Region 2 Pesticide Recommended Protection Measures that this chemical (Isopropylamine salt of Imazapyr) is practically non-toxic to fish and invertebrates. Since we are selectively applying small diluted amounts of Habitat to trees (not directly into the surface water) and not within 1 day of forecasted precipitation, we do not anticipate any negative effects to any sensitive species adjacent to treated stumps.

Garlon 3A herbicide (EPA Reg No 62719-37) will be applied to saltcedar, utilizing a cut-stump method. Target plants will be cut to near ground level with chainsaws, followed by the spraying of cut surfaces with hand held or backpack sprayers. Even though Garlon 3A can be used in aquatic habitats, this chemical will not be used within 10 feet of open water. There should therefore be no negative effects to sensitive fish species. Treatments will not occur within 1 day of forecasted precipitation. Application will occur throughout the year when target plants are most susceptible to the selected treatment method.

Renovate 3 herbicide (EPA Reg No 62719-37-67690) will be applied to saltcedar, utilizing a cut-stump method. Target plants will be cut to near ground level with chainsaws, followed by the spraying of cut surfaces with hand held or backpack sprayers. Even though Renovate 3 can be used in aquatic habitats, this chemical will not be applied directly to open water; therefore no negative effects to fish species should occur. Selective spot treatment methods applied to the cut stumps surface only will limit the amount of chemical directly contacting surface waters harboring any sensitive species. Treatments will not occur within 1 day of forecasted precipitation.

Rodeo herbicide (EPA Reg No 62719-324) will be applied (using a ¾ - 2% solution) to resprouts of saltcedar utilizing foliar application methods throughout the year. Small resprouting target plants will be treated up to the water's edge (aquatic label) with the use of hand-held sprayers or backpack sprayers. This product is not known to be harmful to fish or invertebrate species (Rainbow trout/LC50 >2500 mg/L, and *Daphnia magna*/EC50 = 918 mg/L) and selective spot treatment methods will limit the amount of chemical directly contacting surface waters harboring any sensitive species.

2.3 Alternatives considered but eliminated from detailed analysis:

Over the years, a number of alternatives have been considered and used for treatment of saltcedar on the refuge. Aerial spraying was considered but was rejected as an option because of its broad spectrum impact to native vegetation. Because saltcedar is intermixed among desirable native plant species in many areas of the river corridor, and because aerial spraying is not very surgical in nature, it was judged that collateral damage to desirable species would be too great to justify this method when considering the herbicides available at this time.

Biological control using saltcedar leaf beetles (*Diorhabda elongate*) has also been considered. An Environmental Assessment for the use of beetles was drafted in 2008, however, a decision notice was not finalized and the U.S. Fish & Wildlife Service will not use biological control at this time.

3.0 AFFECTED ENVIRONMENT

This section provides a description of the affected resources determined to be applicable to the Proposed Action Alternative and the No Action Alternative. The Bitter Lake NWR encompasses 24,609 acres in three tracts. The North Tract includes the Salt Creek Wilderness. The Middle Tract includes most of the developed infrastructure, including the refuge headquarters, visitor center, tour loop roads, maintenance facilities, and water impoundments. The South Tract is not open to the public and includes refuge croplands, which support and attract large numbers of wintering migratory birds.

The proposed action area is entirely within the North Tract of the Refuge. Approximately 1,500 acres (1,200 acres outside of the wilderness and 300 acres within the Salt Creek wilderness) along the Pecos River in the North Tract is estimated to be infested by saltcedar. Aerial photography and satellite imagery are currently being used to more accurately map saltcedar infestations on the refuge.

3.1 Physical Environment:

The entire project area is located within the historic floodplain of the Pecos River in the North Tract of the Refuge. It is comprised of river bottomlands, grasslands, sand dunes, and mixed shrub communities. The gently rolling terrain is cut by many small arroyos and contains red clay bluffs and numerous gypsum sinks.

3.1.1 Air Quality:

Under the Clean Air Act (42 USC 7401-7671q, as amended in 1990), the Service has a responsibility to protect air quality and related values from the adverse effects of air pollution and to comply with federal, state, and local air pollution control laws and regulations. The Salt Creek Wilderness is designated as a Class I area. In such areas limits are placed on the maximum allowable increases of sulfur dioxide, particulate matter, and nitrogen oxides above established baseline concentrations. Visibility impairment at the Salt Creek Wilderness is monitored by the Service as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) Program. The project area has excellent air quality, due to the rural land uses in most of the surrounding area. Refer to data concerning the Salt Creek IMPROVE monitoring station located approximately 8 miles south of the refuge north tract for detailed air quality information <http://vista.cira.colostate.edu/views>.

3.1.2 Soils / Geology:

Bitter Lake NWR is located in the Lower Pecos Valley Subsection of the Great Plains Physiographic Province of Southeastern New Mexico. Much of the Pecos Valley Section is underlain by Permian bedrock units composed of gypsiferous and saline evaporites, limestone and dolomite, mudstone, shales, and sandstone. Dissolution of evaporite and carbonate units is an active geomorphic process affecting landscape evolution in much of the region, and various sizes of solution-subsidence depressions are common landforms. From essentially the headwaters of the Pecos River, the sedimentary rocks of limestones, shales, and sandstones dip off the mountains in an easterly direction to form a large continuous regional aquifer system. The permeability of the aquifers varies considerably depending on the degree of dissolution or fracturing that has taken place. These processes have been most active in the southern part of the area and have resulted in the well known Roswell Artesian Basin.

Soils in the area are dominated by aridisols, which are not well suited for dryland agriculture because they lack the necessary moisture to support any long term growth except arid-adapted vegetation. The soil horizon is low in organic matter and is light in color. Aridisols also exhibit special fertility problems due to unavailable micronutrients resulting from a high pH.

3.1.3 Water Resources and Quality:

The Bitter Lake NWR is at the juncture of the Roswell Artesian Basin of southeastern New Mexico and the Pecos River. The Roswell Artesian Basin is a natural hydrologic basin that extends from the summits of the Capitan, Sacramento, and Guadalupe Mountains to the west extending just beyond the Pecos River on the east. It includes most of Chaves County and Torrance, Guadalupe and Roosevelt Counties. The Pecos River runs through the eastern side of the basin from north to south through the Refuge. Several small tributaries drain from the west to the east, with the most prominent being the Hondo River. These two systems and their interactions account for the diversity of water resources within the Refuge, including sinkholes, springs, natural wetlands, oxbow lakes, and riparian riverine habitat. In the North Tract, major features include the Arroyo del Macho and Salt Creek. Arroyo del Macho is an ephemeral stream that drains into Salt Creek. Salt Creek is also fed from groundwater springs and drains into the Pecos River from the west.

The Roswell artesian aquifer and the Pecos River provide water for agricultural, industrial, residential, and recreational use for much of southeastern New Mexico and west Texas. The River and associated wetlands provide essential breeding, wintering, and migratory habitat for a tremendous number and diversity of wildlife, including one of the highest concentrations of endangered and sensitive species in the state of New Mexico. Water availability and habitat quality are strongly impacted by saltcedar infestation.

3.2 Biological Resources/Environment:

3.2.1 Vegetative Communities:

Vegetation on the Refuge consists primarily of mixed Chihuahuan shrub/grassland with areas of riparian vegetation. The native shrub vegetation is dominated by four-wing saltbush and is associated with a scattering of mesquite, creosote and iodine bush. The grassy understory is dominated by alkali sacaton, inland salt grass, and gyp grama. Areas adjacent to water courses contain riparian vegetation dominated primarily by saltcedar. Coyote willow and seepwillow occur to a lesser extent but represent the native vegetation component. Cottonwoods occur only in extremely scattered patches. The project area occurs mostly within these riparian areas.

3.2.2 Wildlife:

The Refuge provides habitat for a wide variety of birds, mammals, reptiles, amphibians, and fish. Wildlife commonly found in the project area include animals such as: the western meadowlark (*Sturnella neglecta*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), western diamondback rattlesnake (*Crotalus atrox*), Couch's spadefoot toad (*Scaphiopus couchii*), and the longnose gar (*Lepisosteus osseus*). The species above mostly occupy native habitat patches throughout the area. Monotypic saltcedar stands do not exhibit the requirements needed for the species above to survive long term without native habitat patches nearby.

3.2.3 Threatened and Endangered Species and Other Special Status Species

The Bitter Lake NWR provides a critical role in maintaining a sanctuary for at least 27 state or federal threatened, endangered, or candidate species. These species are primarily found in the Middle tract of the Refuge and include: the Pecos puzzle sunflower (*Helianthus paradoxus*), Roswell springsnail (*Pyrgulopsis roswellensis*), Koster's springsnail (*Tryonia kosteri*), Pecos assiminea (*Assiminea pecos*), Noel's amphipod (*Gammarus desperatus*), Pecos bluntnose shiner (*Notropis simus pecosensis*), Pecos gambusia (*Gambusia nobilis*), and interior least tern (*Sterna antillarum*). The Pecos gambusia was once introduced into several of the sinkholes within the North Tract. More recent surveys indicate that those introductions were not successful. The Pecos bluntnose shiner occurs in the Pecos River throughout all three Refuge Tracts. Historically, bluntnose shiners were found within the main channel habitats of the Rio Grande, Rio Chama, and Pecos River, New Mexico, and Texas. The Rio Grande subspecies (*Notropis simus simus*), which was last collected in 1964 was determined to be extinct during the 1970s. In 1976, the State of New Mexico gave formal protection to the Pecos River subspecies (*Notropis simus pecosensis*). In 1987, the USFWS listed the shiner as a threatened species. At the time of listing, intermittent water flow of the Pecos River was identified as the greatest threat to the shiner and its habitat. Water diversions, groundwater and river water pumping, and water storage have reduced the amount of water in the channel and altered the hydrograph with which the shiner evolved (USFWS 2003).

3.3 Human Environment:

3.3.1 Cultural Resources:

No surveys have been conducted in the immediate vicinity of the proposed action, and no sites have been recorded. Large prehistoric archaeological sites and some historic features are known to exist on other parts of the Bitter Lake NWR. Large block surveys have been conducted in the upland areas immediately east of the Refuge in support of oil and gas development. Those conducting these inventories have recorded numerous archaeological sites, indicating extensive prehistoric use of the area nearby and the potential for discovery of more resources through surveys. However, the project area falls within the 100-year Pecos River floodplain. No structures are present, and the possibility of finding intact archaeological sites retaining integrity is low due to past disturbance from flooding and channel modification.

3.3.2 Socioeconomic Resources including Public Use/Recreation:

The Refuge is located approximately nine miles from the city of Roswell, New Mexico, with a population about 50,000. Several other small towns are also within thirty to ninety miles away. The predominant land uses in the vicinity of the refuge are grazing, irrigated farming, and some oil and gas development. The Roswell Chamber of Commerce lists the Refuge as one of the area's main attractions. The Bitter Lake NWR attracts approximately 35,000 to 40,000 visitors annually. Principal recreational activities include wildlife observation, hiking, photography, environmental education, and hunting. The North Tract specifically provides opportunities for primitive recreation, including hiking, equestrian use, hunting, and sightseeing and is visited by about 500 visitors annually. The Refuge also plays a role in the local economy as Refuge employees typically live in the community, own property and support local businesses through routine purchases.

3.3.3 Visual Resources:

The Pecos River is the most notable natural feature and visual resource within the project area, however, because sightseeing or wildlife observation is an activity allowed on the North Tract the entire area could

be considered a visual resource. Aside from the Pecos River, the North Tract does offer views of the mesa, native and nonnative riparian vegetation, and Chihuahuan shrub/grassland vegetation

3.4 Salt Creek Wilderness:

The 9,621-acre Salt Creek Wilderness was established under PL 91-504 on October 23, 1970. The Wilderness Act defines wilderness as an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions. The wilderness includes a line of red clay-gypsum bluffs, gypsum sinkholes, sand dunes, and native plant communities. This area still has remnants of what were once farm fields that existed before it was designated as a wilderness area. The tract is now managed as a “naturally functioning ecosystem” for scientific research, vegetation management, wildlife management, and monitoring. The area provides opportunities for primitive recreation, including hiking, equestrian use, hunting, and sightseeing. Within the Salt Creek Wilderness there is still an underground natural gas pipeline, installed along a right-of-way in the early 1950s, which crosses the tract diagonally from northeast to southwest. Also, there is a distribution power line along much of the south wilderness boundary and an active natural gas well lease in the southwest corner of the area.

The Refuge has and will continue to manage the Salt Creek Wilderness area in accordance with the Wilderness Act and U.S. Fish & Wildlife Service wilderness policies. In addition, section 35.7 in Title 50 of the Code of Federal Regulations states that “To the extent necessary, the Director shall prescribe measures to control wildfires, insects, pest plants, and disease to prevent unacceptable loss of wilderness resources and values, loss of life, and damage to property”.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes and discusses the potential environmental effects or consequences that can reasonably be expected by the implementation of the alternatives described in Chapter 2.0 of this EA. An analysis of the effects of management actions has been conducted on the **physical environment** (air quality, water quality, and soils); **biological environment** (vegetation, wildlife, and threatened and endangered species); and **socioeconomic environment** (cultural resources, socioeconomic features including public use/recreation, and visual and aesthetic resource). The direct, indirect, and cumulative impacts of each alternative are considered. **Direct effects** are the impacts that would be caused by the alternative at the same time and place as the action. **Indirect effects** are impacts that occur later in time or distance from the triggering action. **Cumulative effects** are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by federal and non-federal agencies, as well as undertaken by private individuals. Cumulative impacts may result from singularly minor but collectively significant actions taking place over a period of time.

4.1 Physical Environment:

4.1.1 Impacts on Air Quality:

Alternative A--No Action Alternative:

No impacts to air quality are expected from continuation of current management.

Alternative B--Proposed Action Alternative:

The proposed action may result in some short-term negative impacts at a local scale, as a result of the mechanical treatments (i.e., using heavy equipment to remove saltcedar). Temporary impacts to air

quality from dust and emissions produced by heavy equipment would be minimal and would be undetectable after the project is implemented.

4.1.2 Impacts on Water Quality and Quantity

Alternative A--No Action Alternative:

Implementing the No Action Alternative would result in the continuation of current conditions. The River would remain locked into a somewhat straightened channel, not allowing natural river movement throughout the floodplain. Historically, annual small scale flood events would naturally change the course of the River, thus allowing for a dynamic flood zone benefiting native species. Water quantity and quality would be expected to remain static in the short-term and decline, resulting in adverse impacts, in the long-term if saltcedar remains present at current densities or the species expands. The species is well known for its high rate of water transpiration and tendency to increase salinity levels throughout the surrounding area when its salt rich leaves drop. This increased salt content on the soils surface can then be transported into nearby water-ways during rain events; thus decreasing water quality on a long term basis.

Alternative B--Proposed Action Alternative:

The direct impacts of proposed mechanical treatments (use of tracked equipment to remove saltcedar) may result in short-term adverse impacts to water quality through increased erosion and sediment added to the water. The long-term indirect effects on water quality are expected to be beneficial. The quantity and quality of available water is also expected to increase when the saltcedar is removed from the system.

It is possible that there is a possible short-term minimal impact to water quality conditions in the project area during the mechanical treatments and for a short period of time afterwards. The potential for this adverse impact would come from soils that are mobilized from mechanical treatments and have the possibility of being washed into the River, thus increasing the suspended sediment levels in the River for a short period of time. However, this system is accustomed to block releases and storm events culminating in flows greater than 3,500 cfs in which the increased turbulence results in sizably increased sediment loads carried throughout the water column. Increased sediment loads or changes in dissolved oxygen levels due to disturbances created by these actions (bank run-off during a sizable storm event) will be minimal if noticeable during such a rare event. In most cases, there is a vegetative buffer consisting of rushes, grasses and willow species between saltcedar trees/shrubs and the river's banks, lessening the chance of increased sediment loads reaching the River. As a result of these actions, the water quality within or downstream of the activity area should not be greatly affected.

Best Management Practices will be implemented to ensure that water quality within the action area is not negatively impacted due to the application of the approved herbicides (Refer to section 2.2 Alternative B). Pesticide Use Proposals have been completed and approved concerning all chemicals to be applied, and requirements will be strictly adhered to during treatments.

Groundwater Hydrology. Although debated, removal of nonnative vegetation could raise the water table in the shallow aquifer adjacent to the Pecos River. Because of the head pressure of the artesian aquifer, the accrual location of any savings is expected to be in the shallow aquifer and the River rather than in the artesian aquifer.

Removing saltcedar from the channel banks may also initially increase water to the system; however, a long-term increase to the system thus far has not been scientifically demonstrated.

4.1.2 Impacts on Soils:

Alternative A--No Action Alternative:

No soil disturbing activities would occur. The thick growth of vegetation along the river banks induces sediment deposition and the buildup of natural levees, which reduce the frequency of beneficial overbank flows.

Alternative B--Proposed Action Alternative:

The proposed action would result in local short-term minor adverse impacts due to some soil disturbance. Mechanical treatments would remove ground cover and disturb the soil, increasing the potential for erosion.

4.2 Biological Environment:

4.2.1 Impacts on Habitat:

Alternative A--No Action Alternative:

If the No Action Alternative is selected, saltcedar would continue to be the dominant vegetation type along the Pecos River in the project area. Saltcedar out-competes native vegetation for space and nutrients where it occurs. Saltcedars are known to increase salinity levels when it drops its salt rich leaves during the winter months thus limiting competition from native plant species that cannot tolerate increased salinity levels. A no action approach will allow saltcedar to spread and infest areas occupied by native plant species.

Long-term negative effects for wetland vegetation and function are anticipated with a no action approach. In time, allowing saltcedar to remain will result in a lower water table, a plant community decreasing in diversity, and fewer areas with self-sustaining wetlands. Water quality would remain the same or lessen due to increased salinity levels, and water turbidity would remain constant instead of allowing for flood events to create backwater wetlands beneficial to native fish and other wildlife.

Alternative B--Proposed Action Alternative:

The proposed action would result in the removal of most of the saltcedar in the area. While saltcedar would be targeted, other species, such as willows, cottonwoods, grasses, and sedges on the banks, may be affected by mechanical removal. There would be a short-term loss of some natural cover provided by this vegetation. While a complete revegetation effort is not anticipated, the Service may selectively plant native perennial species after saltcedar removal in order to improve the success and speed of recovery concerning native riparian species and habitats, to reduce erosion, and to allow for a more natural environment with limited large woody species. On the sections of the Bitter Lake NWR where saltcedar has been removed in the past, native grasses have reestablished in the original habitat within a few years, and the return to native habitat seems to be permanent. Areas where strips of saltcedar were removed in the early 1960s still retain the distinctive stripped pattern today, with little encroachment into the restored areas to date. However, the restored areas would be closely monitored to prevent the reestablishment of saltcedar and other nonnative species as much of the work will be performed within more moist soil conditions (i.e. more conducive to saltcedars) than much of that which has been done in the past.

The Proposed Action is designed to have a major long-term positive effect on riparian vegetation. Nonnative invasive saltcedar has crowded out most native vegetation and understory. In addition, when saltcedar leaves drop; they spread throughout the surrounding area, increasing ground and surface water

salinity levels. This decreases the chance of growth by native vegetation and decreases water quality. Removing saltcedar would allow for the development and expansion of more diverse riparian vegetation and habitats, capable of supporting a greater variety of wildlife. Removing saltcedar would also decrease the risk of wildfire by removing the dense highly flammable saltcedar stands that readily cause sterilization of the soils surface when burned. After allowing native grasses and shrubs to regenerate, wildfires should burn at lower temperatures which limit the amount of sterilized earth and usually benefits native grasses in the long run.

Similar long-term positive effects for wetland vegetation and function are anticipated by removing saltcedar. These actions should result in a higher water table, a more diverse plant community, and more areas with self-sustaining wetlands. Benefits of the improved wetlands include protecting and improving water quality, providing fish and wildlife habitats, slowing down/storing floodwaters, and maintaining surface water flow during dry periods.

4.2.2 Impacts on Wildlife:

Alternative A--No Action Alternative:

Under the No Action Alternative, the existing habitat conditions would be maintained. There would be no change in diversity or abundance of wildlife that use the area.

In the absence of any action to control saltcedar, infested habitat would continue to be suboptimal for those species that should occur naturally in the area. A few species of songbirds make limited use of saltcedar on the refuge. Western kingbirds, Bullock's orioles, blue grosbeaks, ladder-backed woodpeckers, summer tanagers, yellow-breasted chats, and yellow-billed cuckoos have been recorded using this habitat on the refuge. The first five species are of little conservation concern and the first three are common breeders in other habitat types on the refuge. The yellow-breasted chat seems to be fairly common in saltcedar, but it is of only moderate conservation concern. Although the yellow-billed cuckoo is not a federally listed species, it is of conservation concern and has been recorded on the Refuge. The yellow-billed cuckoo did not historically utilize this habitat and only came in after large mature stands of saltcedar were established. There have been no recent nesting records of this species on the refuge. The above species will remain the same if saltcedar is not removed and bird species which historically utilized these habitats such as Cassin's sparrows (*Aimophila cassinii*) will remain displaced.

The refuge harbors a good number of native small mammals which serves as a food source for many species of raptors, reptiles, and larger mammals. This includes species such as the desert shrew (*Notisorex crawfordi*) and the Ord's kangaroo rat (*Dipodomys ordii*) that inhabit the refuge grasslands and other native habitats. Refuge monitoring efforts indicate that monotypic saltcedar stands are not suitable for the above species and have very low concentrations of small mammals in general. Diverse habitats tend to harbor a greater number of species. A no action approach will limit the ability of native wildlife to occupy habitats infested by saltcedar and these acres will remain to be minimally beneficial to native animals.

Saltcedar thickets are known to serve as shelter for feral hogs, which are present on all tracts of the refuge. This invasive exotic species causes significant damage to native plants and animals due to its omnivorous habits and the high degree of physical disturbance caused by its rooting behavior when it feeds. Such saltcedar shelter and problems with hogs will remain or increase with time if saltcedar is left untreated.

Alternative B--Proposed Action Alternative:

There would be some short-term adverse impacts on small mammals, birds, and other wildlife due to habitat loss and displacement during the first year's (August-March) initial project implementation; however, native habitat is abundant in the surrounding area and no loss of species diversity or abundance is likely. The possible short-term decline in wildlife numbers is not expected to be enough to affect the area's overall wildlife populations and is expected to be outweighed by the expected wildlife benefits associated with the restoration and expansion of native habitat. Following the initial treatment, native species should reoccupy the restored sites, and small scale follow-up treatments should not impact wildlife species that colonize the activity area.

Best Management Practices will be implemented to ensure that negative impacts to wildlife due to the application of herbicides (Refer to section 2.2 Alternative B) are minimized. Pesticide Use Proposals have been completed and approved concerning all chemicals to be applied, and requirements will be strictly adhered to during treatments.

Long-term positive effects are anticipated for wildlife species. Restored riparian vegetation is expected to increase the abundance and diversity of birds, mammals, reptiles, amphibians, and fish in response to expanded habitat availability and quality. Some species may have declined in the past due to loss of natural riparian habitat; the restoration and expansion of native habitats should benefit these species in the long term. Effects on wildlife would not be immediate but would come with the establishment of diverse native vegetation.

Removing vertical structure of vegetation would likely affect birds seeking cover or perches. The loss of saltcedar may also impact a few species of songbirds that use them for nesting. Mechanical removal will not occur during the active nesting period of songbirds (April –July); therefore bird nesting activities will not be affected. Historically, birds along the Pecos River utilized the native willows, grasses, and sedges adjacent to the Pecos River as nesting and/or foraging habitat. Grassland nesting birds such as Cassin's sparrows, western meadowlarks, and lark sparrows should increase within the area as native vegetation is reestablished. Native shrubs such as coyote willows should provide habitat for western kingbirds, blue grosbeaks, yellow-breasted chats, and northern mockingbirds.

Feral hogs, mule deer, and white-tailed deer, use saltcedar thickets for cover. It is not known how important this cover is for their survival. Reduction in saltcedar density will presumably impact both hogs and deer to some extent. Deer should not be impacted as much as feral hogs due to the presence of suitable habitat throughout the surrounding areas. Deer should readily utilize stands of willow, honey mesquite, and giant sacaton as cover when saltcedar is removed.

4.2.3 Impacts on Threatened and Endangered Species and Special Status Species:

Alternative A--No Action Alternative:

Under the No Action Alternative, the existing (less than optimal) habitat conditions would be maintained.

The Pecos bluntnose shiner is the only listed species that currently occurs in the North Tract of the Refuge. The Pecos bluntnose shiner prefers a dynamic riverine habitat which changes in time due to high water events and erosive movements of the Pecos River banks and main channel. Historically, the River meandered throughout the Pecos River Valley annually creating new plunge-pools and backwater habitats, beneficial to the shiner and its reproductive requirements. A no action approach will allow saltcedar to continue to stabilize the rivers, which would have a negative long-term impact on the Pecos bluntnose shiner. The other species are not known to occur in the North Tract, thus failure to control

saltcedar will not impact them.

Alternative B--Proposed Action Alternative:

Since saltcedar removal will occur on the North Tract, and all known populations of listed species other than the Pecos bluntnose shiner do not currently occur there, a no effect determination has been made for those species. The Pecos bluntnose shiner is limited to the Pecos River which does flow through the North Tract. Saltcedar reduction on the refuge is likely to have limited effects on river flows, but any increase would presumably be beneficial. Effects on bank stability and shading are likely to be more pronounced. Less stable banks would result in a more dynamic river channel, which would create or enhance shiner habitat. Reduced shading would bring habitat conditions back to a more natural state. Protection measures will be set in place in order to ensure that no negative effects will occur to the shiner as a result of this activity.

In order to completely assess the impacts on special status species, the Service is conducting an Intra-Service Section 7 consultation. The Endangered Species Act requires this process for actions that may affect listed and proposed species. Although including candidate species is not required by law, it is Service policy to consider candidate species when relevant in making natural resource decisions.

Generally, special status bird species are not known to nest or to be resident in the proposed restoration project area. The Proposed Action may have minor short-term negative effects on some wintering special status migratory birds due to noise and removal of vegetation used for cover, and/or perches. This activity will not occur during the active nesting period of migratory birds.

Southwestern willow flycatchers are not known to nest along the Pecos River drainage in New Mexico, though they have been observed migrating through the Bitter Lake NWR. Restoration may benefit this species during migration, thus providing an increased diversity of prey after saltcedar has been removed and native vegetation persists and recovers. The effort should benefit this species due to increased available acreages of native riparian habitat that should harbor flycatcher prey items. There are no nesting pairs within 105 miles of the Proposed Action; therefore, no negative effects are expected from this action.

4.3 Human Environment:

4.3.1 Impacts on Cultural Resources:

Alternative A--No Action Alternative:

Under this alternative, there are no anticipated direct or indirect impacts to the cultural environment, as current conditions would be maintained, and no ground disturbance would occur.

Alternative B--Proposed Action Alternative:

Under the Proposed Action Alternative, there could be impacts to cultural resources, if any archeological sites are found within the project area where mechanical treatments and ground disturbance are going to occur. While this is a possibility, past experience and knowledge of the area indicates that this is unlikely. According to the Region 2 Archaeologist, the project area falls within the 100-year Pecos River floodplain. No structures are present, and the possibility of finding intact archaeological sites retaining integrity is low due to past disturbance from flooding and channel modification.

4.3.2 Impacts on Socioeconomic Resources including Public Use/Recreation:

Alternative A--No Action Alternative:

The economic and social condition of the area would remain the same. The Refuge will continue to be one of the area's main attractions. The presence and operation of the Refuge provides economic benefits to the surrounding communities within a 30 mile radius in several ways. The Refuge attracts local, national, and some international visitors and by attracting visitors to the area, the Refuge generates revenue for the local economy. Much of the Refuge's annual budget is recycled into local businesses through Refuge staff, purchases of equipment and supplies, as well as contracts for local labor to accomplish Refuge projects. The Refuge provides full-time employment for 11 individuals that live in nearby communities.

The North Tract specifically provides opportunities for primitive recreation, including hiking, equestrian use, hunting, and sightseeing and is visited by about 500 visitors annually. The no action alternative would most likely impact recreation slightly because of the displacement of native vegetation by saltcedar.

High rates of evapotranspiration due to saltcedar infestation would continue. If saltcedar expands, then this loss of water would increase. Spring flows from the Refuge are an important source of water for the Pecos River, which supplies water for irrigation, recreation, and other uses in the Carlsbad Irrigation District and Texas.

Alternative B--Proposed Action Alternative:

The proposed action would have a positive impact on the local economy through the hiring of local contractors to remove and treat saltcedar.

The proposed action is expected to improve the habitat conditions for fish and wildlife, which is expected to lead to an increase in recreational opportunities for members of the public interested in the range of outdoor experiences offered by the refuge. This could result in a long-term positive impact to the local economy from increased public visitation to the Refuge.

4.3.3 Impacts on Aesthetic and Visual Resources:

Alternative A--No Action Alternative:

There would be no change to the existing visual landscape.

Saltcedar is highly visible, but not very attractive. The continued presence of saltcedar under the no-action alternative would preclude the establishment of native plant species (cottonwood, willow, etc.) that most people find more attractive and certainly more natural.

Alternative B--Proposed Action Alternative:

Implementing the Proposed Action would have a short-term minor negative effect on visual resources on the Refuge. Minor visual effects could occur from construction equipment, dust, and the loss of vegetative cover. In the long term, visitors may experience improved visual quality of the site and its surroundings consistent with natural riparian function and vegetation.

In contrast to public use at the Middle Tract, the North Tract experiences very little visitation with most occurring during hunting seasons. There would be minimal impact on aesthetic and visual resources. To most people, saltcedar is not especially attractive for most of the year. Reducing saltcedar will also result

in a more naturally appearing landscape.

In the Salt Creek Wilderness, there would be short term disturbance due to the use of chainsaws which has been identified as a minimal tool for the initial removal of saltcedar. The long term benefit would be providing a more natural wilderness area.

4.3.4 Impacts on Wilderness Values

Wilderness values generally refer to the establishment of areas where the earth and it's community of life are untrammelled by man, where man is a visitor who does not remain; areas of undeveloped land retaining their primeval character and influence, without permanent improvements; areas that are protected and managed so as to preserve their natural conditions; and areas that provide outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Alternative A—No Action Alternative:

Generally, no action would promote the untrammelled and undeveloped quality of the Salt Creek Wilderness as the direct human influence associated with saltcedar management actions would not occur. However, because saltcedar infestations are originally the result of human influence, the untrammelled quality or value will decline progressively over time as saltcedars continue to expand.

As saltcedar would remain untreated, the natural quality of the Salt Creek Wilderness would be diminished as the naturally occurring system is allowed to continually be displaced by non-native saltcedars. Also, as saltcedar populations progressively decline throughout the rest of the Pecos River Valley, non-control of saltcedar on the wilderness promotes a secondary unnatural threat from feral hog populations that immigrate from elsewhere in search of saltcedar as protective cover.

No action would also degrade the wilderness recreation experience as it is in part dependent on the wilderness setting representing a natural and native ecosystem. Natural vegetation types, habitats, and fish and wildlife species that depend on the historic natural conditions offer more diverse aesthetic, scenic and recreation opportunities than inaccessible, monotypic stands of saltcedar.

Alternative B--Proposed Action Alternative:

Short-term trammeling will occur as a result of the direct human influence associated with saltcedar management actions. However, any such effects will be limited as the work will only occur in those areas that are infested and mitigated by the fact that saltcedar would not be allowed to continue to expand and threaten the conservation ideal in general. The majority of the Salt Creek Wilderness will remain in an untrammelled state.

Because this project does propose active management actions, there will be effects to the undeveloped quality of wilderness character, however, the effects will be short lived with the overall goal of restoring the area's primeval character and influence. No permanent structures or facilities will be constructed.

Although the use of chainsaws and herbicides is not natural or primitive, the act of removing the non-native saltcedar will promote a more "natural" quality for the Salt Creek Wilderness over the long-term by promoting native vegetation and reducing the influence of non-native species on all components of the wilderness resource.

In the short term, the presence of treatment crews will adversely affect the wilderness experience of those in the area. However, certain effects will be minimized as work will only occur in those areas that are infested and mitigated as access will be improved by the removal of inaccessible dense thickets of saltcedar. Immediate effects may be further minimized by the marking of work areas and known times of treatment. Overall, the wilderness recreation experience is in part dependent on the wilderness setting representing a natural and native ecosystem. When naturally occurring systems, which offer more diverse viewing and recreating opportunities, are gradually displaced by monotypic stands of saltcedar the aesthetic, scenic, and habitat values enjoyed by visitors are degraded. By removing the saltcedar, vegetation types, habitats and fish and wildlife species that depend on the historic natural conditions will be preserved for the benefit of the visiting public.

4.4 Assessment of Cumulative Impacts:

A cumulative impact is defined as an impact on the environment that results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can “accumulate” spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially cancelling out each other’s effects on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource.

This analysis considered an area larger than the Refuge, within the Pecos River Valley. The Refuge, the Bureau of Land Management (BLM), Bureau of Reclamation (BOR), the Carlsbad Irrigation District (CID), and others have gone to great lengths to control saltcedar in the Pecos River Valley. Its presence is in an essentially uncontrolled state on the North and South Tracts of the Refuge, and occurs in areas of the Middle tract that have proven difficult to access for more standard means of control, thus increasing the risk that it could expand back into areas from which it has been removed in the past. Such renewed spread could impact waterfowl and other migratory bird habitats, as well as threatened and endangered species. Also, as saltcedar populations progressively decline throughout the Pecos River Valley, any non-control of saltcedar on the Refuge promotes a secondary threat from feral hog populations that migrate from elsewhere in search of saltcedar as protective cover.

The Refuge is not aware of any other past, present or future planned actions that would result in a significant cumulative impact when added to the Refuge’s proposed action, as outlined in Alternative B. The adverse direct and indirect effect of the proposed action on air, water, soil, habitat, wildlife, aesthetic/visual resources, and wilderness values are expected to be minor and short-term. The benefits to long-term ecosystem health that this riparian restoration project will accomplish far outweigh any of the short-term adverse impacts discussed in this document.

4.5 Environmental Justice:

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations; February 11, 1994) was designed to focus the attention of Federal Agencies on the

environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations. The order is intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low income communities with access to public information and opportunities for participation in matters related to human health and the environment.

Neither of the alternatives described in this EA will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low income populations. Implementation of the proposed action is anticipated to benefit the environment and people in the surrounding communities.

4.6 Indian Trust Assets:

No Indian Trust Assets have been identified in the Pecos River Basin. There are no reservations or ceded lands present. Because cultural resources are not believed to be present, no impacts are anticipated to result from implementation of either alternative described in the EA.

4.7 Irreversible and Irretrievable Commitment of Resources:

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that this use could have on future generations. Irreversible effects primarily result from the use or destruction of specific resources that cannot be replaced within a reasonable time frame, such as energy or minerals. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action, such as extinction of a threatened or endangered species or the disturbance of a cultural resource. Neither the Proposed Action nor the No Action Alternative would result in a large commitment of nonrenewable resources.

Project implementation would require the irretrievable commitment of fossil fuels (diesel and gasoline), oils, and lubricants used by heavy equipment and vehicles. The Proposed Action would result in unavoidable harm or harassment to some wildlife. The Service would implement best management practices to minimize potential impacts.

4.8 *Table 1 - Summary of Environmental Effects by Alternative:*

<u>Environmental Resource</u>	<u>Alternative A:</u> No Action Alternative	<u>Alternative B:</u> Proposed Action Alternative
Impacts to Air Quality	None	Negligible short-term adverse impact
Impacts to Water Quality and Quantity	No short term impacts; long term adverse	Minor short-term adverse impact; long-term beneficial impact
Impacts to Soils	Long-term impacts due to salt deposition from dropping leaves	Minor short-term adverse impact; long-term beneficial impact
Impacts on Habitat	No short-term; long-term adverse (habitat degradation)	Short-term adverse impact; long-term beneficial impact
Impacts of Wildlife	Long-term effects from loss of native habitat	Minor short-term adverse impact; beneficial long-term

		impact
Impacts on Threatened and Endangered Species	No short term impacts; long term adverse (reduced habitat quality)	None short-term; beneficial in the long-term
Impacts on Cultural Resources	None	None
Impacts on Socioeconomic Resources; Public Use/Recreation	None	Beneficial
Impacts on Aesthetic and Visual Resources	Long-term impact to visual quality	Moderate short-term adverse impacts; beneficial in the long-term
Impacts on Wilderness Values	None	Moderate short term adverse; long-term beneficial impacts

5.0 CONSULTATION, COORDINATION AND DOCUMENT PREPARATION

Document prepared by Refuge Staff, Bitter Lake National Wildlife Refuge, U.S. Fish and Wildlife Service, Roswell, NM.

5.1 Agencies and individuals consulted in the preparation of this document include:

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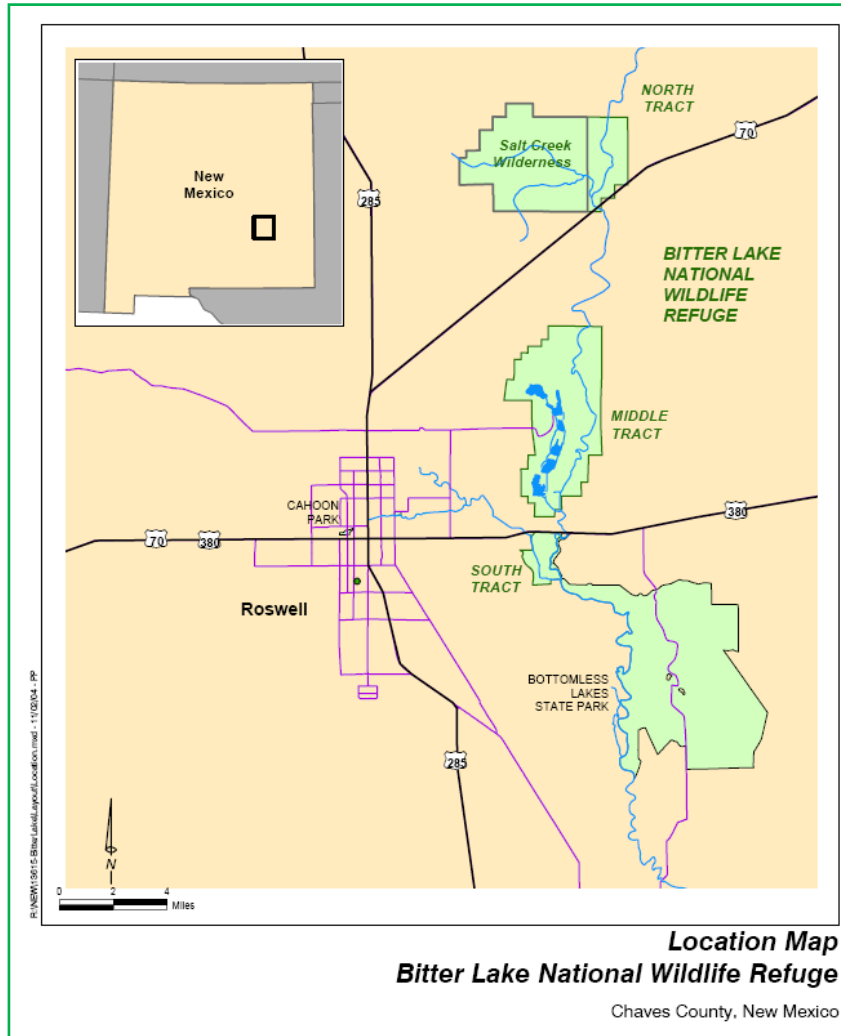
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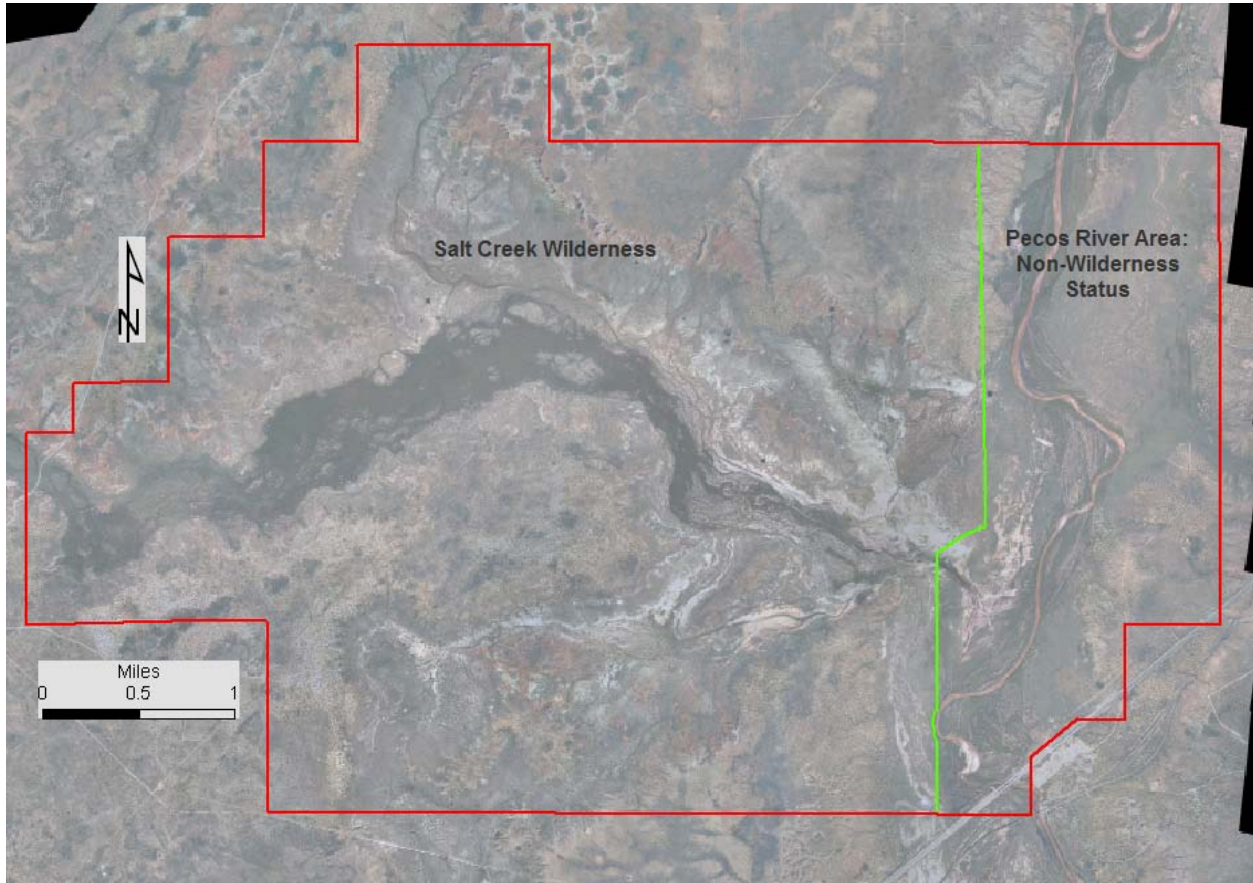
Appendix A:

Location Map Bitter Lake National Wildlife Refuge



Appendix B:

Map of North Tract on the Bitter Lake National Wildlife Refuge Including Salt Creek Wilderness



Appendix C:

Map of Saltcedar Infested Areas on North Tract

